



KQ30 Technical Manual



KQ30 Equalizer Technical Manual
Version 1.0
January 1, 2002

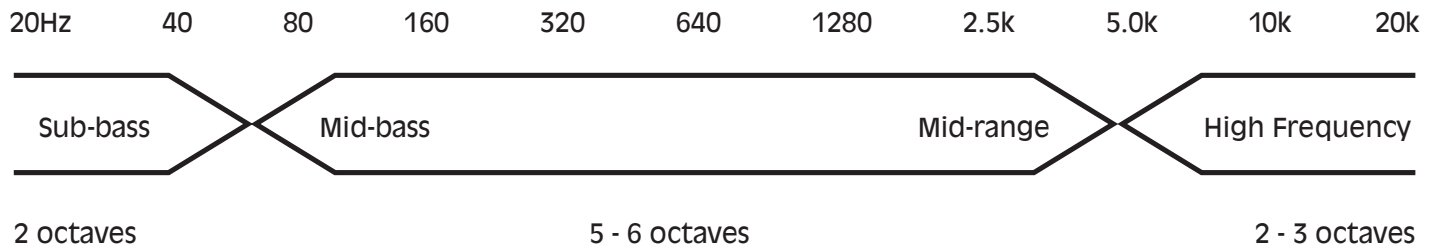
Introduction

This Technical Manual covers all the information contained in the KQ30 installation manual plus more in depth information concerning the installation, setup and use of your new KICKER equalization tool. Be sure to check our web site at www.Kicker.com for the latest information on this or any other KICKER product.

OK, so your best bud talked you into buying this thing...or maybe it was the installer at your favorite shop...the salesman was on a selling high and rolled one into your new system...or maybe you just liked the thought of playing with ALL those dials! No matter what got you here, we will now help you get the most out of it.

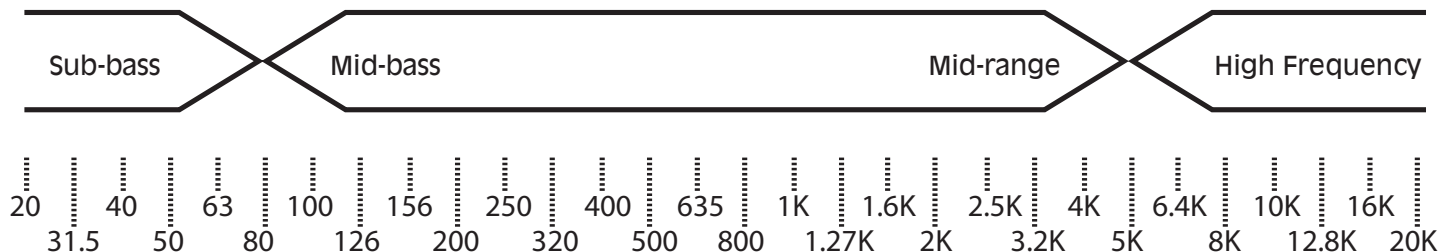
The first thing we need to understand is that everything we hear whether it is musical instruments, a person's voice or the constant howling of the cat next door is comprised of sounds that fall within the 10 octaves of frequencies that we as human beings can hear. An octave is simply a halving or a doubling of a frequency from a given starting point and for most of us that starting point is 20 Hz (the lowest low frequency which we can hear). An octave up from 20 Hz would be 40 Hz. The next octave up is 80 Hz, then 160 Hz and so on and so on until we reach the limit of our hearing which tops out at 20 kHz (the highest high frequency we can hear). Everything we can hear falls within this 20 Hz to 20 kHz range. Unless you're my cousin Bernie who claims he can hear grass grow...but that's another story.

The 10 Octaves of Human Hearing (20 Hz to 20 kHz)



Ok, so now we know what an octave is and what the 10 octaves of the human hearing range are. What is 1/3 octave? Well...it is simply the same 20 Hz to 20 kHz range broken into 1/3 octave slices. To calculate 1/3 octave intervals is pretty easy too. You simply start at 20 Hz and multiply it by 1.26 to get 25.2 Hz, we simply round this to 25 Hz. So 1/3 octave up from 20 Hz is 25 Hz. The next step up from 25 Hz would be 25 x 1.26 or 31.5 Hz. Next 1/3 octave step is 31.5 x 1.26 or 39.69 Hz. Like above that is rounded to 40 Hz. This goes on and on all the way up to 20 kHz.

One Third Octaves from 20 Hz to 20 kHz



Un-Fun Math Notice

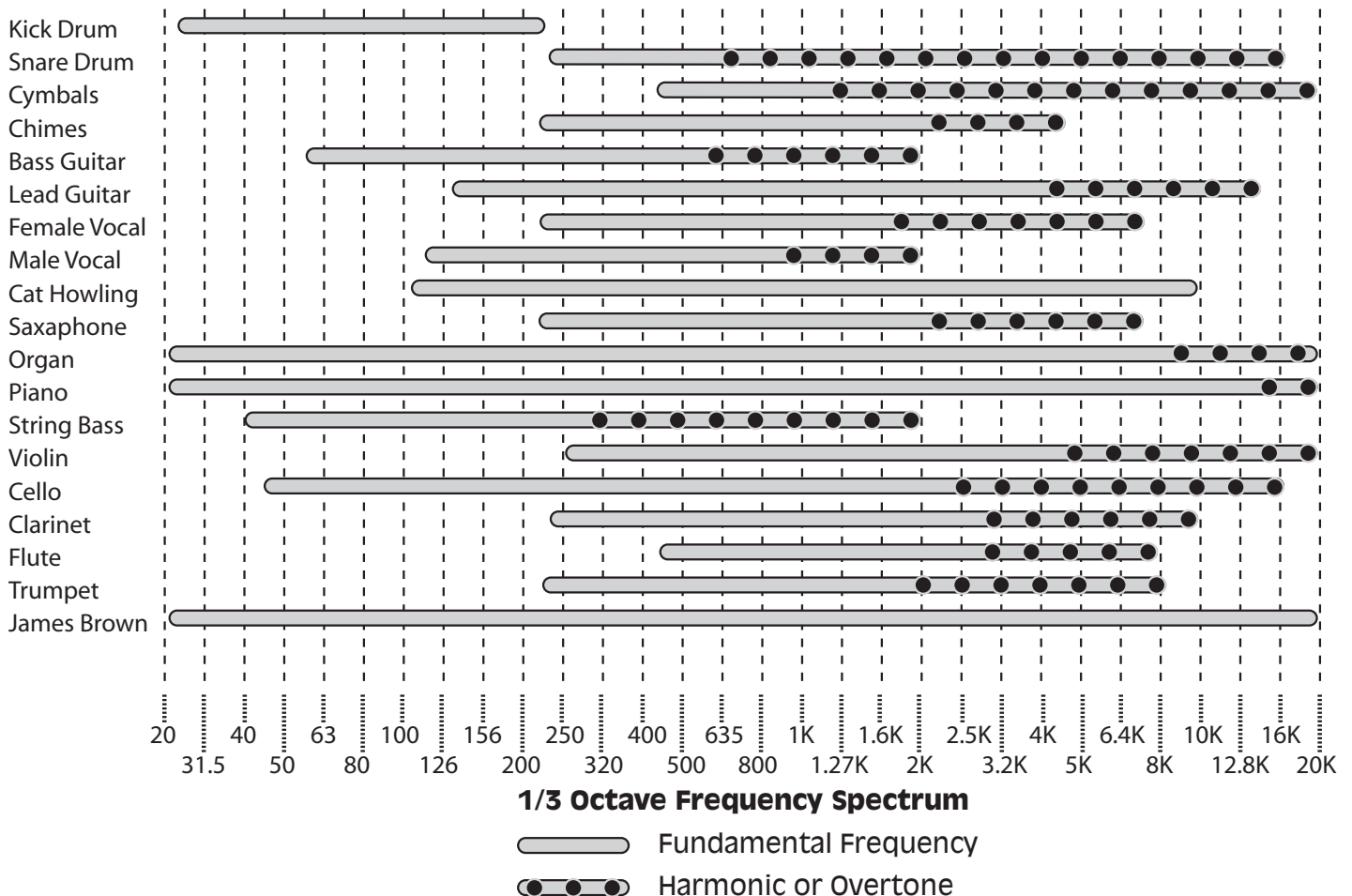
Right now you might be saying to yourself just where do we get 1.26. Isn't .33 equal to 1/3? Just trust us when we say to use 1.26...we are skipping a bunch of difficult math. We hear in a logarithmic scale, not linear, and 1.26 breaks the logarithmic scale up into 1/3 slices. OK? Good! Let's move on.

Introduction

So if our hearing works within these 10 octaves, where does 1/3 octave come into play? Why 30 bands? Well, through extensive research at the world famous [Huh! Earology Institute](#), Dr. Koneairea determined that 3 dB changes between 1/3 octaves are the smallest changes the human ear can easily detect. His lab assistant Mongo agreed that 30 bands was best since that was the maximum number of dials he could draw on the chalk board. So 30 bands it was.

Seriously though, the Kicker KQ30 is a 30 band, 1/3 octave equalizer designed for tailoring your sound system to better fit your listening environment (your car we hope) or to just make it sound like you want it to sound. Through experimentation it has been shown that the way the human ear sums energy in the Critical Bands to determine the loudness of a sound are about one third octave apart. Because of this, one third octave spacing is all that is required to tune a system within the capabilities of the average human ear. You could use an equalizer with tighter spacing (like a 1/6 octave) but this would only present you with twice as many dials to adjust (60+...Ouch!) and no better audible results than a finely tuned 1/3 octave unit. In other words, a lot more work for no audible benefit. Even the 'Super Tweaks' at Kicker who just love to play with buttons, switches and dials agree that 1/3 octave is the way to go!

The chart below gives you a good idea where some of the musical instruments and voices operate within the 1/3 octave scale. The Fundamental Frequencies are the primary sounds the instrument makes when played. The Harmonics or Overtones are multiples of the Fundamental sound. Think of it like striking a hollow drum. When you hit the drum it makes a distinct sound, but there are also extra sounds that reverberate from the original strike. These extra sounds are Harmonics. These Harmonics plus the Fundamental give every instrument, voice or sound it's own unique sound.



Introduction

The previous chart gives you an idea where popular instruments and voices are located in the audible spectrum. Knowing this can help give you some direction on tuning your vehicle for that certain sound you are after or adding a little more definition and character to a particular instrument. In most cases nothing you do will help the cat howling except a well thrown shoe and James Brown has plenty of definition and character just the way he is...adjustments here are not required.

The chart below breaks the frequency ranges down into smaller groups and gives you a general idea of how each range effects the musical spectrum. The last column on the right gives you an idea of what can happen if you apply too much equalization to that area.

Equalization is like adding spices to your food. Not enough and the food tastes bland...too much and your reaching for the water. The right amount of boosting and cutting will really make your system shine.

Frequency Range	Affected Area	Results Of Excessive Boost
16 Hz - 60 Hz	Sense of power, music is felt more than heard.	Makes music sound muddy.
60 Hz - 250 Hz	Fundamentals of the rhythmic section. Equalizing here can change the musical balance making it fat or thin.	Makes music sound boomy.
250 Hz - 2000 Hz	Low order harmonics of most musical instruments that are horn-like. Listening fatigue may result if improperly equalized.	Gives telephone like quality to the music. Can make the music sound tinny.
2 kHz - 4 kHz	Speech recognition.	Listening Fatigue. Will add a lisping quality to voices. "M", "V" & "B" will become vague.
4 kHz - 6 kHz	Affects clarity and definition of voices and instruments. The music will seem closer to the listener with proper setting.	Sibilance on vocals (harshness). Adding boost at 5 kHz will make the music seem louder.
6 kHz - 20 kHz	Brilliance and clarity of sounds. Gives air and pressence to the music.	Sibilance and/or harshness on voices

Introduction

To properly adjust the KQ30 equalizer it is highly recommended that you, someone you know or the local dealer have and be familiar with the use of a 1/3 octave RTA (Real Time Analyzer). The RTA allows you to see where the major peaks and dips in your system's response curve are located and dial in the proper amount of boost or cut at the correct frequencies to get a smooth overall system response. The RTA should not be the only source of input to tell you what needs tweaked, you must also listen. There can be times where no matter how good it looks on the RTA display, it simply sounds bad to the ear. By the same token, a curve that may show some uneven response may actually sound pleasing. You always want to start with the RTA and look for major peaks and valleys, fix these and then listen. Do this back and forth until you get a response as smooth as possible and also sounds realistic.

Here are 5 basic pointers to keep in mind as you start your quest on eq perfection:

1.) Your goal is a smooth curve with no more than a 3 dB difference between bands. Flat lines, happy faces or ski slopes are not necessarily the goal, unless you are into that sort of thing.

2.) Always cut first, boost last and keep your boosting to as little as needed to get the desired results. For every 3 dB you boost a band you are asking your amp to double its power output at that frequency.

3.) Equalization does not change the basics. A properly adjusted equalizer is not a Band-Aid for poor components or installations. Address these issues first...Eq last.

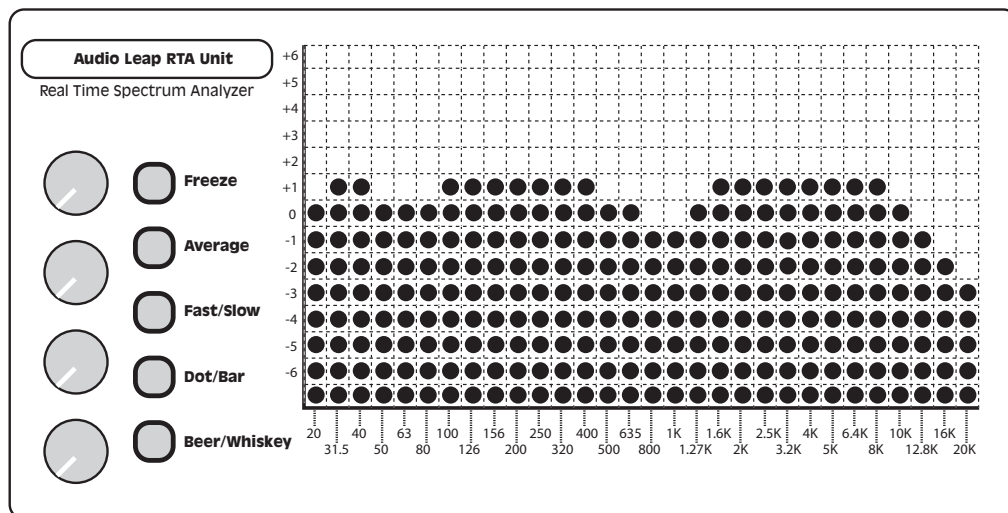
4.) If you find certain frequency valleys that do not respond from boosting you may have some cancellation at that frequency due to the speaker placement, speaker phasing, crossover phasing, or simple vehicle acoustics. If this is the case then address these issues separately. See your Kicker dealer for more details and help in correcting these issues.

5.) Your ears are always right. No matter how good or bad it looks on the RTA, if it sounds bad...it sounds bad. Period. Let the RTA guide you and your ears tell you if it is right.

If you do not have access to a RTA you can still do a decent job of getting your system to sound good. Simply sit in the car with the KQ30 within reach and listen to some well recorded music that you are familiar with. Start at the lowest EQ band and work your way up one at a time. Try boosting and cutting and stick with what sounds best. You may find you need to move back and forth between bands that are close together as boosting or cutting one may require changes to the other bands closest to it. Be sure to compare what you have with what you had (the EQ/Bypass switch) to make sure you are going the right direction. If you get to a point that it sounds worse than when you started then simply set all the dials back to flat (0 position) and start again. It is a good idea to keep track of your settings and notes on a piece of paper so that if you do need to start over, you know what you had. This can be helpful if you want to re-create certain settings or avoid them.

If all else fails...refer to the advice above which states..."it is highly recommended that you, someone you know or the local dealer have and be familiar with the use of a 1/3 octave RTA (Real Time Analyzer)".

With all that said, let's dive in and get started.



Features

30 Bands at 1/3 Octave Spacing As stated above in the Introduction, a 1/3 octave equalizer gives you all the control necessary to adjust your sound system for a smooth response or to dial it in to your ears liking. The KQ30 gives you the ISO standard 30 bands at 1/3 octave spacing from 20 Hz to 20 KHz.

12 dB Boost or Cut At each of the 30 1/3 octave spaced controls you can boost or cut the intensity of the signal by up to 12 decibels (dB). Plenty of control and then some since most systems typically need no more than 6 dB of boost or cut to get things dialed in.

High Voltage Pre-amp There are quite a variety of head units on the market today, not to mention if you are using a line driver or pre-amplifier in your system. The KQ30 will work with an audio input signal as little as 500 mv up to a mind numbing 9 Volts! Plenty of range to work with anything you can throw at it. At the same time it can deliver a full 9 volts of audio output to send down the line to your crossovers or amplifiers.

Separate Left and Right Input Controls For the best possible sound quality and least amount of noise you want to get your KQ30 matched up to your head unit, the separate left and right input sensitivity controls let you do just that. Being separate allows you to tweak input channel balancing as well.

Separate Left and Right Output Controls To minimize noise in your system you want to pass as much audio signal voltage as you can down the line to the next component. Too much and you will cause undesired distortion...not enough and your system will sound thin and not play to it's full potential. The left and right output controls allow you to find just the right amount of signal to accomplish this and do any channel balancing tasks required at this stage.

Separate Left and Right Input Clipping LED's Clipping the input of your pre-amp components is not a good thing when you want clean sound. The LED indicators are a great tool to help you in setting up the input gain controls on your KQ30. These indicators will blink as you get within 3 dB of clipping the input section of your unit.

Separate Left and Right Output Clipping LED's Just as with the input, you do not want to clip the output of your KQ30. The output LED indicators will blink as you get within 3 dB of driving the KQ30 into clipping to help you with setting up your eq.

Mono / Stereo Selector The KQ30 is a stereo equalizer and will do its magic on both the left and right channels at the same time. For those 'Livin' Loud' tweakers who want to have separate left and right controls, you can use two units and equalize the channels independently. Just grab two units, flip the switches to Mono, and you are ready to go!. In Mono mode the KQ30 will sum whatever is input to both the left and right channels into a mono signal and then pass this signal to both the left and right outputs. See the diagrams further in this manual for details.

EQ / Bypass Switch Whether your tweaking your system by ear to get that sound you want or using a real time analyzer for an ultra smooth response curve, you'll find times when you want to compare what you had...to what you got. This is what the EQ /Bypass switch does. When in bypass mode it sends the input signal directly to the output jacks without any equalization. So with a simple press of the switch you can compare life before the KQ30...and after!

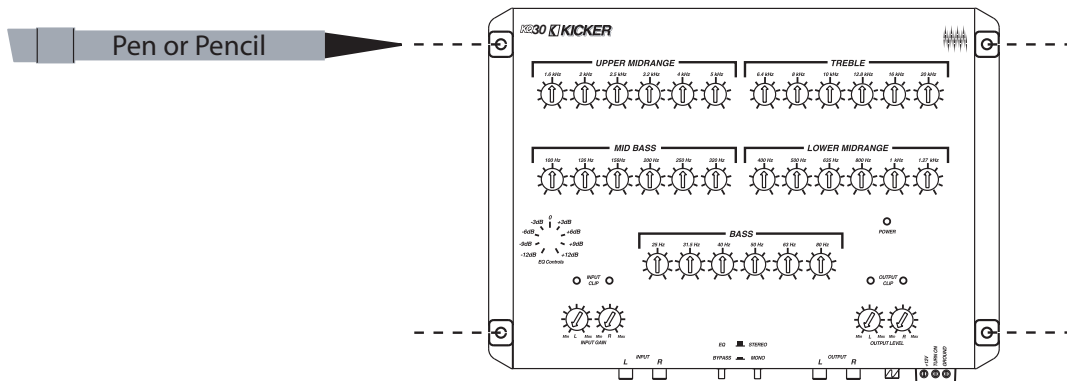
Three Year Warranty When you're 'Livin' Loud' you want the tunes to roll non-stop and we couldn't agree more. When you purchase your KQ30 from an authorized KICKER dealer we back it up with a full year warranty...parts and labor. If you have an authorized KICKER dealer install it for you at the time of purchase we push that warranty out to a full **THREE** years! We build our products to give you years of trouble free performance and know that if it is installed right the first time you will get just that...so we back it up!

Mounting Instructions

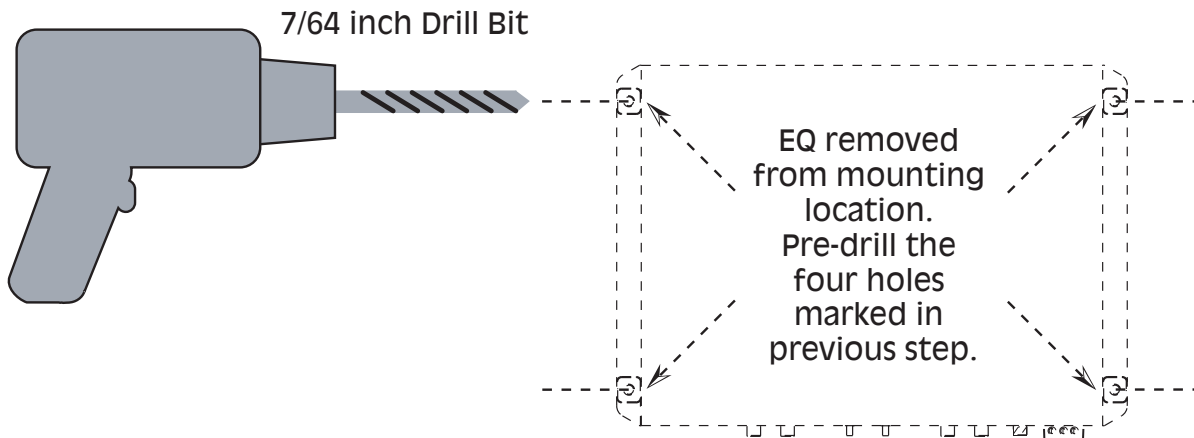
When selecting a location to mount your Kicker KQ30 equalizer be sure it is structurally sound and that there are no items behind the area that could be damaged by the screws. Check for wiring, brake lines, fuel lines, gas tanks, etc.

Remember that the controls on top of the equalizer will need to be accessible for adjustment later. Keep this in mind as you choose your equalizer's mounting location.

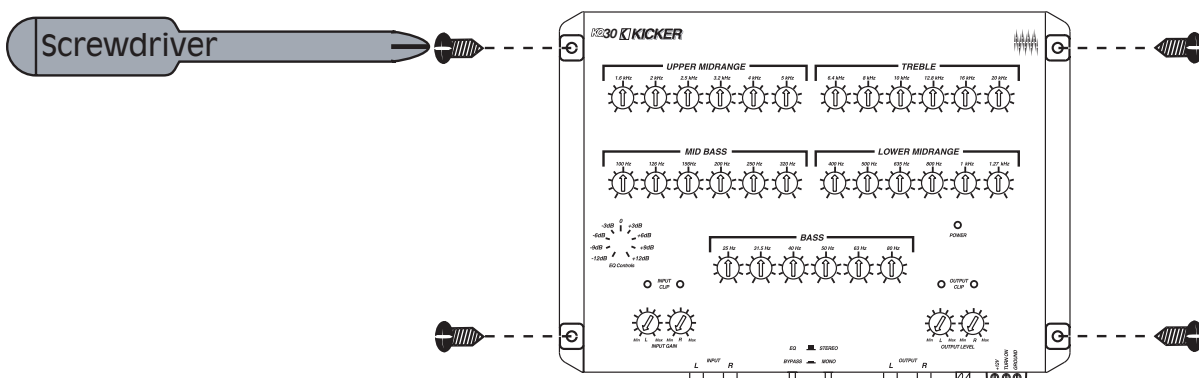
Now that you are ready to mount your equalizer, use the KQ30 chassis as a template and mark the four mounting hole locations with a marking pen or pencil.



Next, remove the KQ30 from the mounting location and using a drill with a 7/64 inch drill bit, pre-drill the four mounting locations you marked in the above step.



Finally, using the supplied screws and a phillips head screw driver, mount the KQ30 into it's new home.



Wiring Instructions

When working with power connections it is always recommended that you disconnect the negative terminal from the car battery to prevent accidents. (Fig. 1) Nothing quite makes your day like a positive voltage wire touching the car chassis or your gear and making sparks fly, blowing fuses or breaking your equipment. Disconnecting the negative terminal from the car's battery will nip this problem right in the bud.

To make wiring the power connections to the KQ30 easier, you can remove the power plug, terminate your wires into it and then re-insert it after all wiring is completed. (Fig. 2)

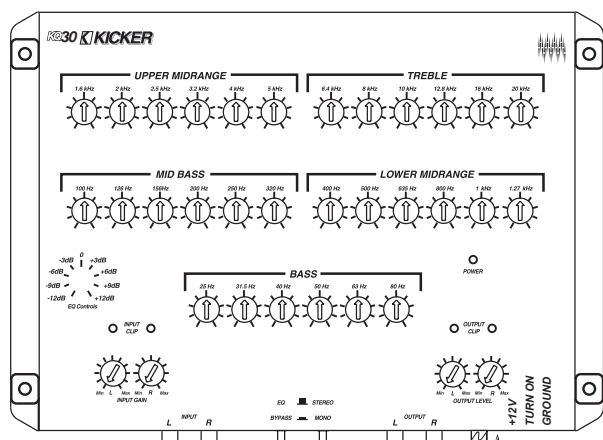


Fig. 2

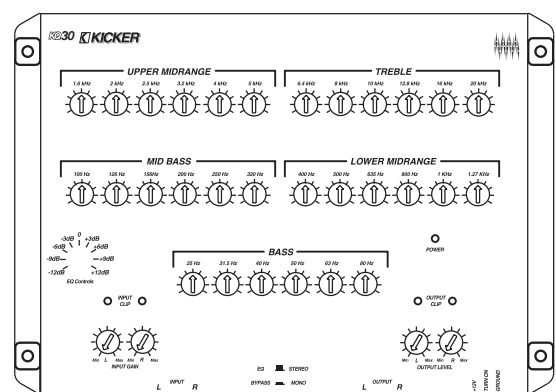


Fig. 3

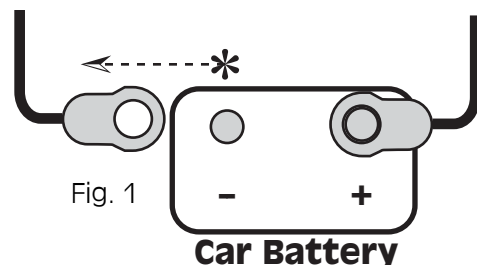
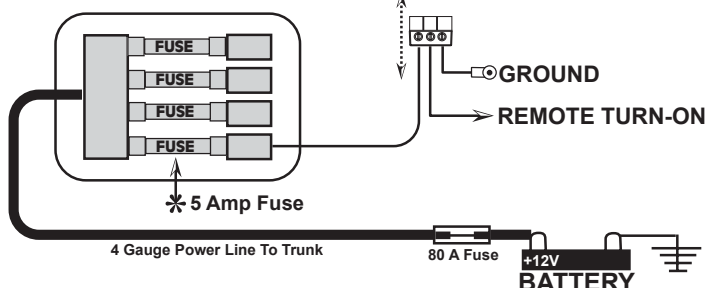


Fig. 1

Car Battery

The ground should be connected to the equalizer first before making any of the other connections. This wire should be as short as possible (36 inches or less) and connected to a paint/corrosion free solid metal area of the car's chassis using 18 Ga wire and a small ring terminal. (Fig. 2 and Fig. 3)

Connect the +12V terminal to a constant 12 volt battery source using 18 Ga wire and an in-line 5 amp fuse. The KQ30 itself has a 2 amp chassis fuse for protection. The additional 5 amp in-line fuse is to protect the wire feeding the KQ30 and should be placed as close as possible to the battery. (Fig. 2)

If you have a fused distribution block in the rear of your vehicle to distribute power to your amplifiers and it has an extra tap, you can use this in place of the in-line fuse as long as you still fuse it for 5 amps. (Fig. 3)

The turn on terminal is connected to your source unit's remote turn-on lead. Most source units have an output labeled 'power antenna' or 'amplifier turn-on' for this connection. If your source unit has both, use the output labeled 'amplifier turn-on'. (Fig. 2 & Fig. 3)

After making all your power connections you can re-insert the power plug into the KQ30 and re-connect your negative battery cable to your car battery. (Fig. 4)

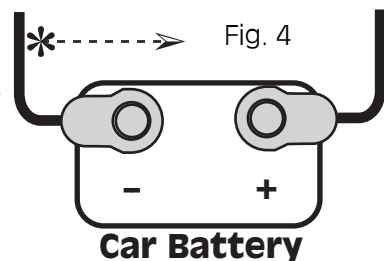


Fig. 4

Car Battery

Wiring Instructions

Signal Cable Tips

- Do This...

The use of twisted pair interconnects is recommended for all installations to minimize noise. (Fig. 1) When routing these cables through the automobile, try to keep them away from factory wiring harnesses and other power wiring. If you need to cross any of this wiring, do so at a 90 degree angle to reduce the possibility of picking up radiated noise. (Fig. 2)

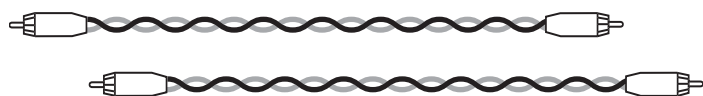


Fig.1

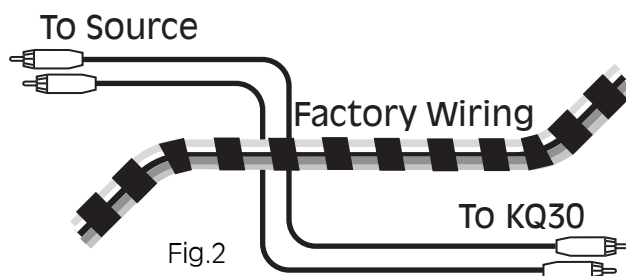


Fig.2

If you have to run your signal cables parallel to a factory wiring harness or other 12 volt wiring, Try to keep you signal cables at least 12 inches away to lessen the chance of getting any induced noise. (Fig. 5 & Fig. 6)

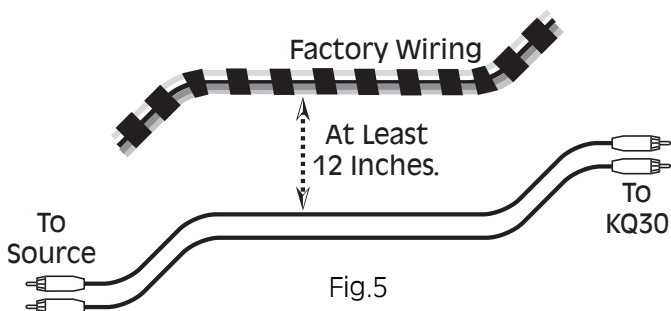


Fig.5

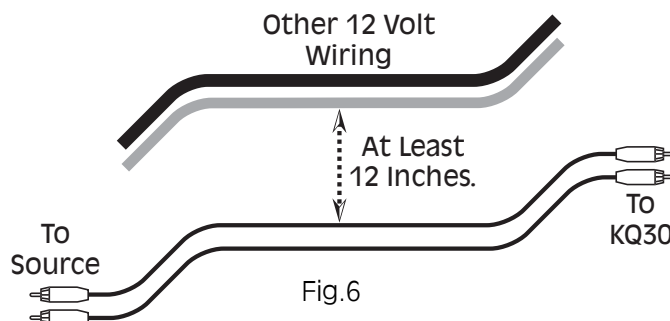


Fig.6

If you have to route the interconnects parallel to factory wiring or other electrical cable, keep the distance they run parallel as short as possible. The longer the RCA cable is parallel with these types of cables, the greater the chance of picking up induced noise. (Fig.6 & Fig. 7)

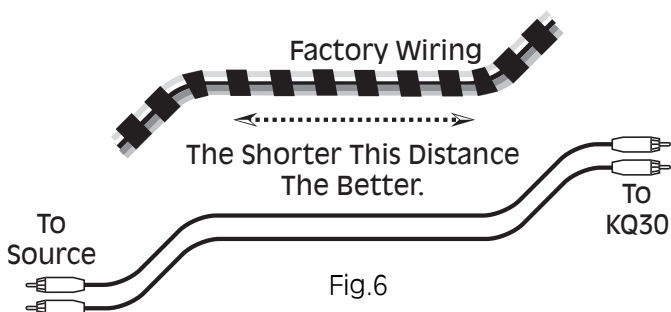


Fig.6

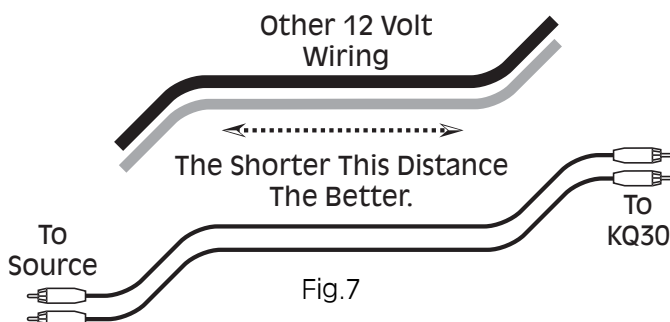


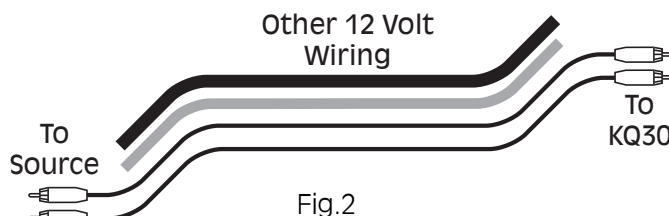
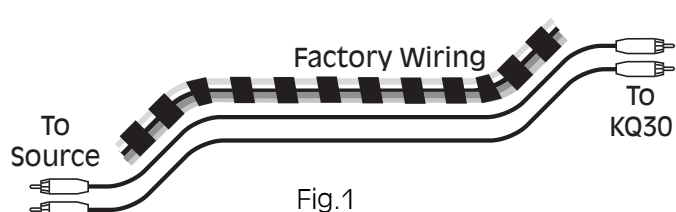
Fig.7

Wiring Instructions

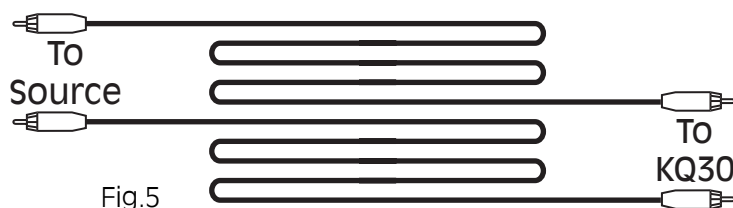
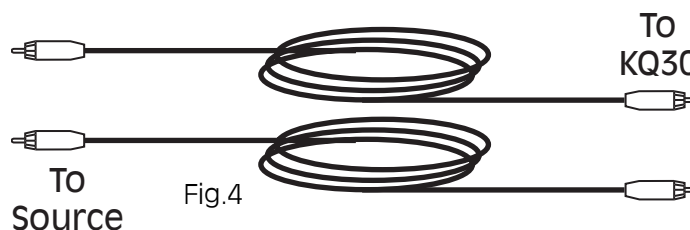
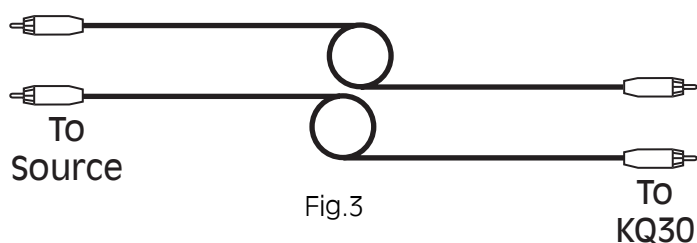
Signal Cable Tips

- Don't Do This...

When routing your signal cables you want to avoid placing them directly next to any factory wiring harness or other 12 volt power wiring. (Fig. 1 & Fig. 2) If you route your cables like this, you greatly increase the possibility of your system picking up noise. If you absolutely have to do this, refer to Figure 6 and Figure 7 on page 9 and keep the distance they run together as short as possible. Or better yet...Don't Do This.



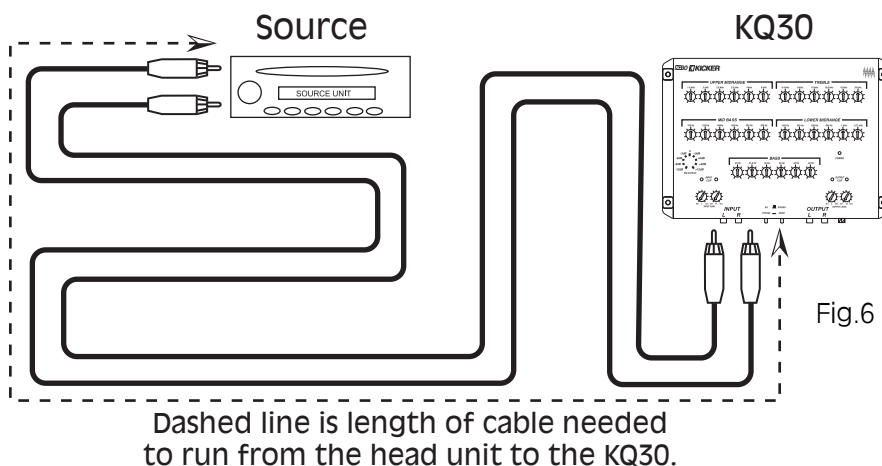
When routing your signal cables, do not coil or tie the cable into loops or bundles. (Fig. 3, Fig. 4, Fig. 5) Doing this enhances the wires ability to act as an antenna and will increase the chances that the cable will pick up induced noise from the car or other wiring and inject it into your audio system.



Finally, do not use an excessively long interconnect cable. (Fig. 6) You want to use just enough cable to get from your source unit to the KQ30 and just a little bit extra for usability and serviceability. Typically 6-12 inches per end is plenty of extra cable to accomplish this.

For example, if the distance from your source unit to the KQ30 is 17 feet (Dashed line in Fig. 6) then use a cable no longer than 19 feet. Do not use a 25 foot cable.

Using more cable than you need leads to the problems described above in Figures 3,4 and 5.



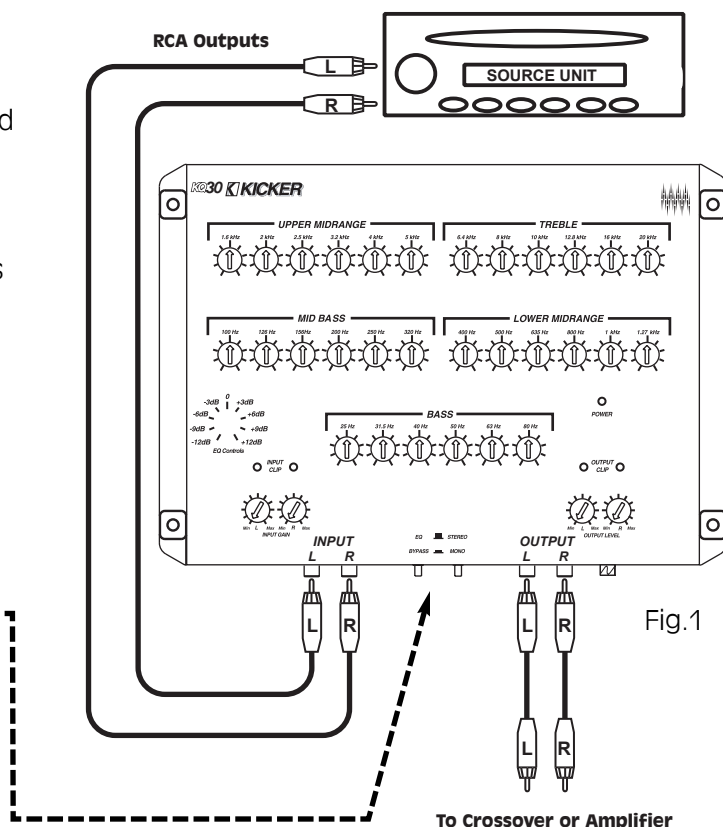
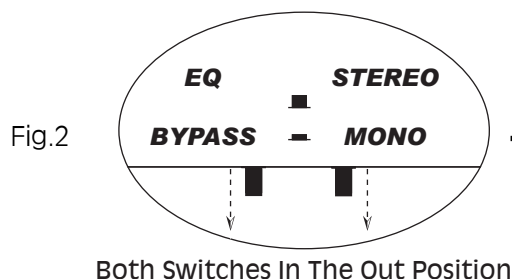
Wiring Instructions

One KQ30 Stereo Operation

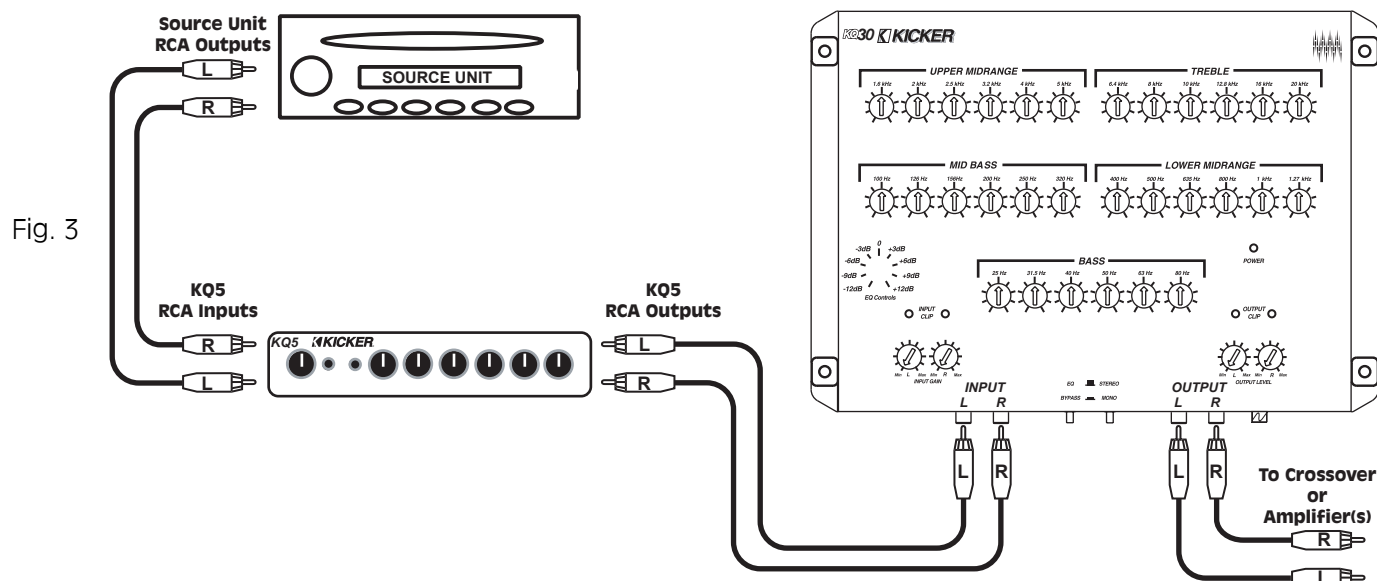
Got one KQ30? Want to equalize both the Left and Right channels? This is the diagram for you. In this application one KQ30 will equalize both the left and right channels simultaneously and output the equalized signal to your system. This is the most common and typical use of a KQ30.

Once you have your interconnect cables routed from your source unit to the KQ30, simply connect the Left and Right channel RCA outputs from your source unit into the Left and Right channel inputs of the KQ30. Take the Left and Right channel outputs of the KQ30 and connect them to the next component in your signal path which is typically your electronic crossover or amplifier(s). (Fig.1)

Check the STEREO/MONO and the EQ/BYPASS switches and make sure they are in the STEREO and EQ (out) positions. (Fig. 2)



In most cases, the KQ30 should be placed directly after your source unit in the signal chain. If you are using a pre-amplifier, like a KICKER KQ5, then your signal chain should go from your source unit to the KQ5 and then on to the KQ30. The output of the KQ30 would then connect to the next component in your signal path which is typically your electronic crossover or amplifier(s). (Fig. 3)



Wiring Instructions

Two KQ30s Stereo Operation

In this application you are using two KQ30s and will have the ability to equalize your Left channel independently from your Right channel. This type of setup is employed by the 'Die Hard' competitors using equalization to move the location of the sound stage in their car or my cousin Bernie who still claims he can hear grass grow.

Once you have your interconnect cables routed from your source unit to the KQ30s, simply connect the Left channel RCA output from your source unit into the Left channel RCA input on KQ30 number 1. Now connect the Left channel RCA output from KQ30 number 1 to the Left channel input of your electronic crossover or amplifier(s). KQ30 number 1 is now the equalizer for just the Left channel of your system. (Fig. 1)

Next, take the Right channel RCA output from your source unit into the Left channel input of KQ30 number 2. Now connect the Left channel RCA output from KQ30 number 2 to the Right channel input of your electronic crossover or amplifier(s). KQ30 number 2 is now the equalizer for just the Right channel of your system. (Fig. 1)

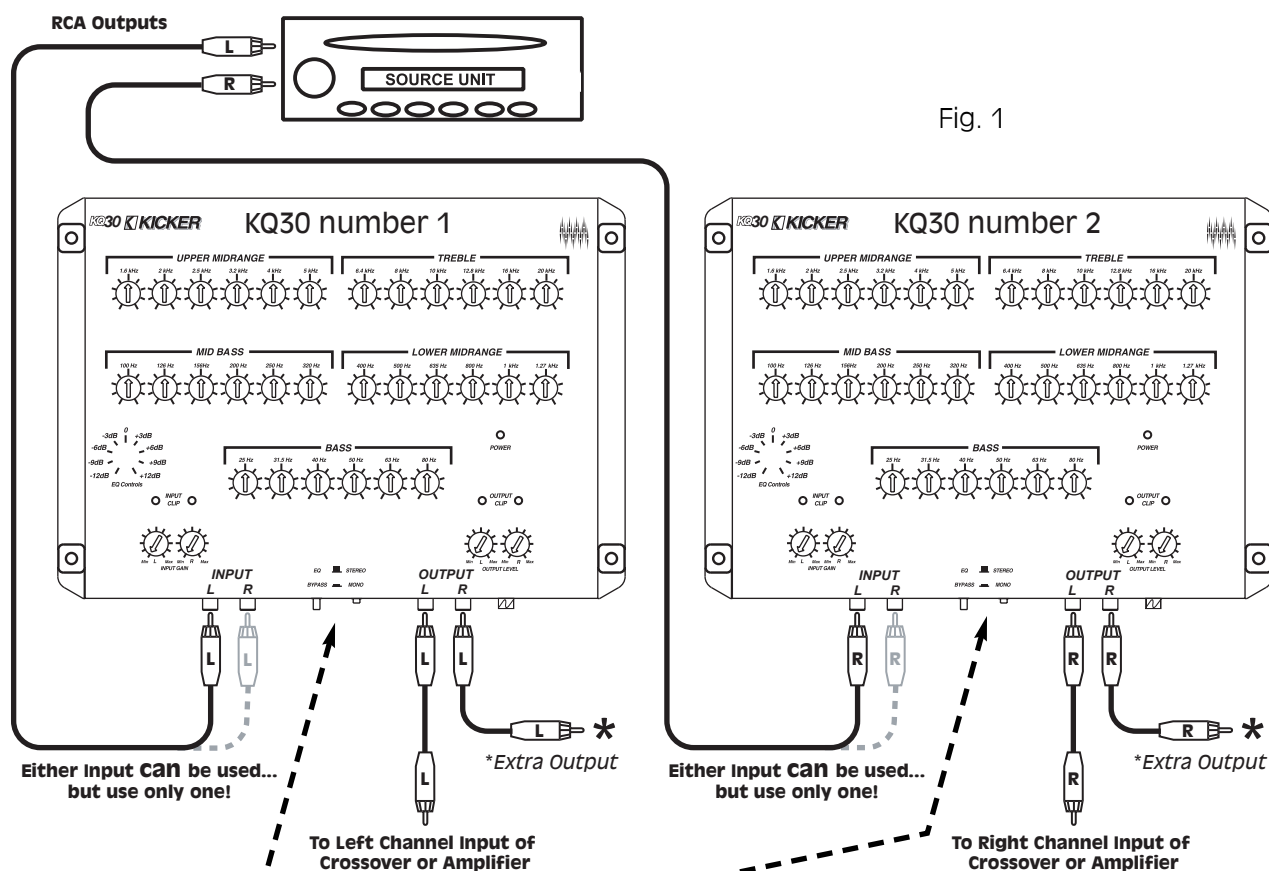
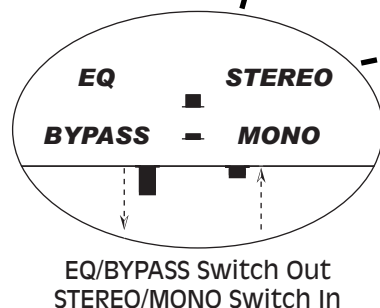


Fig. 1

Fig.2



Check the STEREO/MONO switch on both KQ30s and make sure they are in the MONO (in) position. Also check the EQ/BYPASS switch on both KQ30s and make sure they are in the EQ (out) positions. (Fig. 2)

* When using the KQ30 in this setup the Right channel Output of each unit is identical to the Left channel of that unit. This is helpful if you need an additional Left or Right stereo channel output to feed another device.

Wiring Instructions

Two KQ30s Stereo Operation (continued)

If you are using a pre-amplifier, like a KICKER KQ5, then your signal chain should go from your source unit to the KQ5 and then on to the KQ30s. The output of the KQ30s would then connect to the next component in your signal path which is typically your electronic crossover or amplifier(s). (Fig. 1)

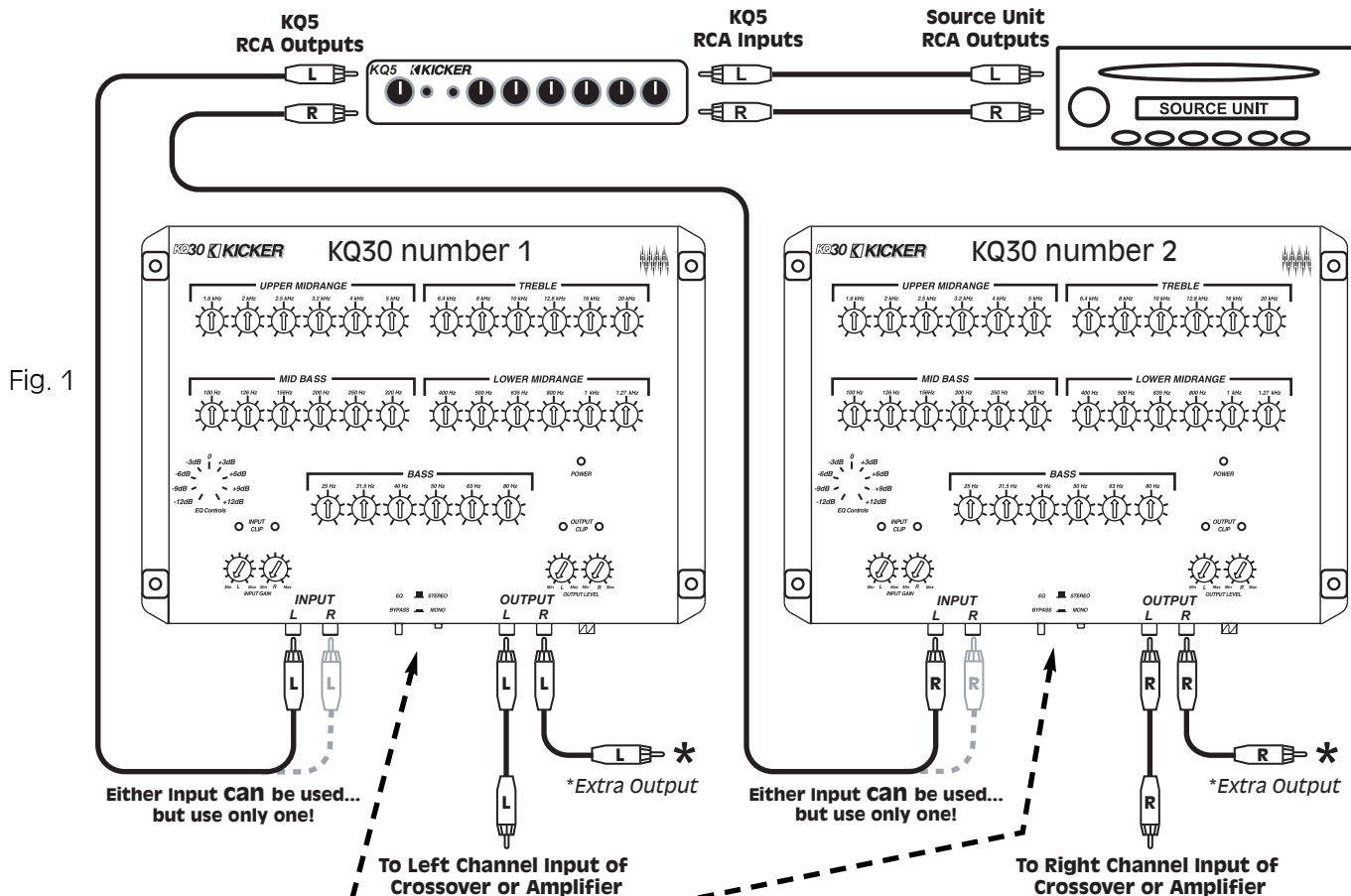
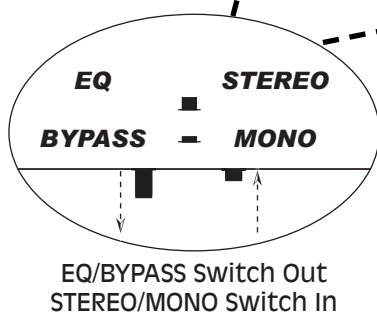


Fig.2



Check the STEREO/MONO switch on both KQ30s and make sure they are in the MONO (in) position. Also check the EQ/BYPASS switch on both KQ30s and make sure they are in the EQ (out) positions. (Fig. 2)

* When using the KQ30 in this setup the Right channel Output of each unit is identical to the Left channel of that unit. This is helpful if you need an additional Left or Right stereo channel output to feed another device.

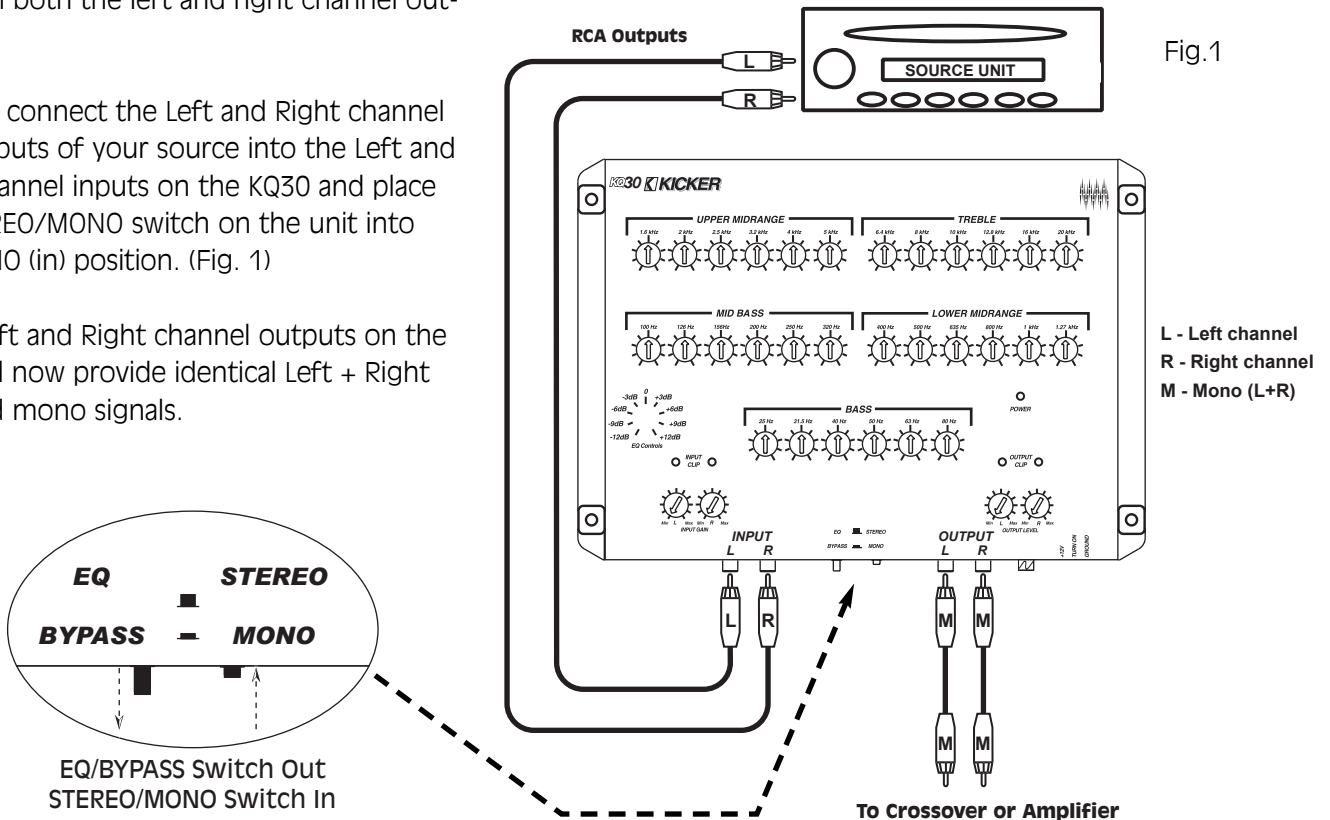
Wiring Instructions

One Unit Mono Operation

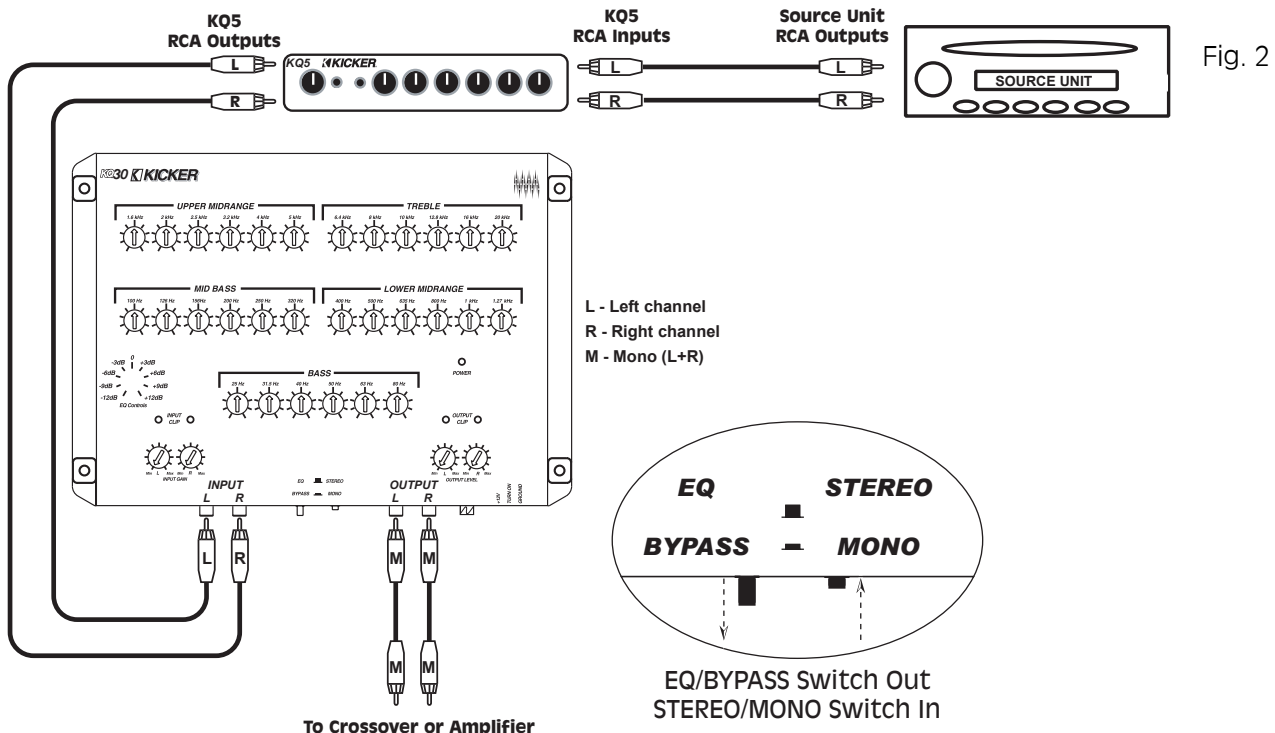
The KQ30 is capable of summing the Left and Right channel stereo inputs into a Mono signal and supplying this signal on both the left and right channel outputs.

Simply connect the Left and Right channel RCA outputs of your source into the Left and Right channel inputs on the KQ30 and place the STEREO/MONO switch on the unit into the MONO (in) position. (Fig. 1)

The Left and Right channel outputs on the KQ30 will now provide identical Left + Right summed mono signals.



Got a pre-amplifier like the KICKER KQ5 too? You know the drill by now. (Fig. 2)

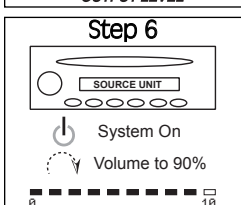
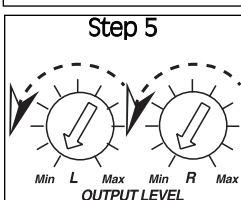
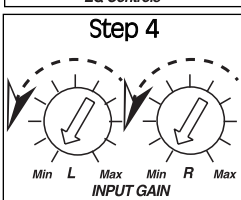
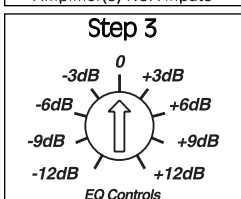
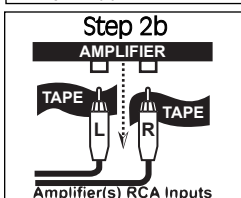
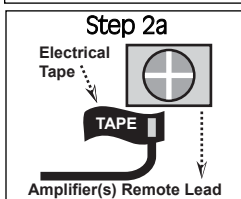
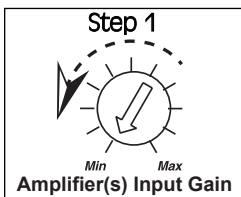


Adjusting Equalizer Controls

Gain Setting Procedure

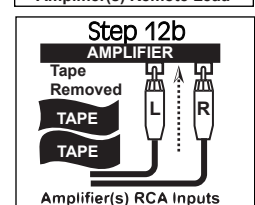
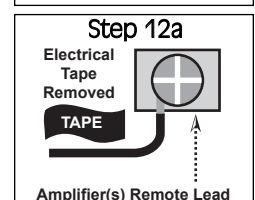
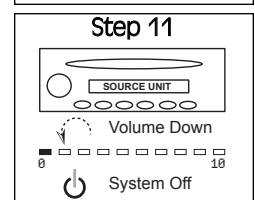
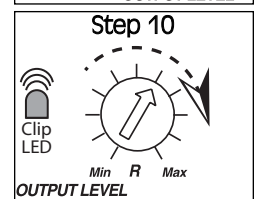
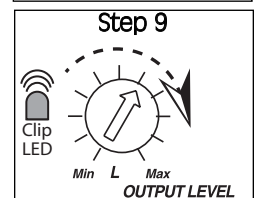
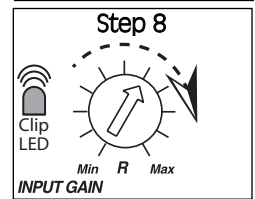
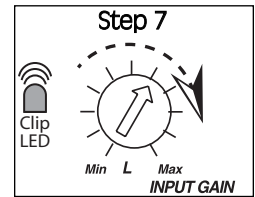
Ok, you now have your KQ30 mounted and wired...ready for action. We now need to adjust the input gain and output level controls on the unit before we proceed with equalization. The whole purpose to level setting is to get as much signal as possible both into and out of a unit without clipping the signal. If these settings are not adjusted properly you can suffer from lack of output, poor signal to noise ratio which results in a lot of audible hissing or even clipping which cause your music to sound harsh and un-natural. Proper level setting will avoid all these pitfalls while giving you the highest performance possible from your system.

This may seem like a difficult process with lots of steps but it is very easy. Just follow the steps one at a time and you will be a level setting pro in no time.



1. Turn the gain controls on your amplifier(s) all the way down.
2. Disconnect the remote turn-on lead(s) from your amplifier(s). **Be sure to insulate the exposed copper wire with electrical tape to prevent accidental damage to your source unit's remote turn-on lead output.** (Step 2a) OR As an alternative, you could disconnect the RCA inputs to your amplifiers and insulate them with electrical tape. (Step 2b) If you choose to disconnect the RCA leads be sure to do this with your system off.
3. Set all the equalization controls on the KQ30 to their center detent (0 dB) position.
4. Set the Input Gain controls on the KQ30 at their minimum (fully counter clock-wise) position.
5. Set the Output Level controls on the KQ30 at their minimum (fully counter clock-wise) position.
6. Using a well recorded CD with a strong signal or better yet a continuous 1KHz tone recorded at 0 dB (track 10 from AutoSound 2000 CD 104), turn your source unit up to 90% of it's maximum output.
7. Turn the KQ30 Left channel Input Gain control up until the Left channel input clipping LED starts to flash.
8. Adjust the KQ30 Right channel Input Gain control to match the Left.
9. Turn the KQ30 Left channel Output Level control up until the Left channel output clipping LED starts to flash.
10. Adjust the KQ30 Right channel Output Level control to match the Left.
11. Turn the source unit down and shut off the system.
12. Re-connect the remote turn-on leads to your amplifier(s). (Step 12a) OR RCA cables. (Step 12b)

* Relax...the initial level setting is now complete. Find a cold beverage and then move on the the next page.



Adjusting Equalizer Controls

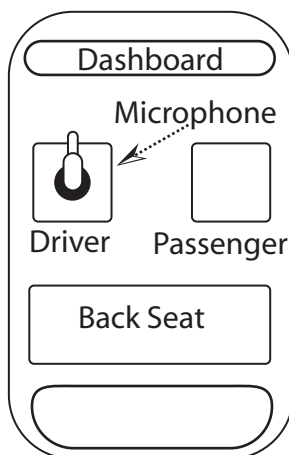
The KQ30 will have enough output to operate most amplifiers to their full power output even with the amplifier's gain control set at its lowest position. Remember, the gain settings on any amplifier are for level matching only, they do not increase the power output of your amplifier. The lowest gain setting that will allow your amplifier to make full power is always best for sound quality, lowest system noise and reliability.

RTA Equalization

OK, now we are ready to get an RTA in the car and adjust the KQ30. If you do not have access to an RTA then skip this section labeled **RTA Equalization**, set the equalizer to what sounds best to you and move to the next section labeled **Final Gain Settings**.

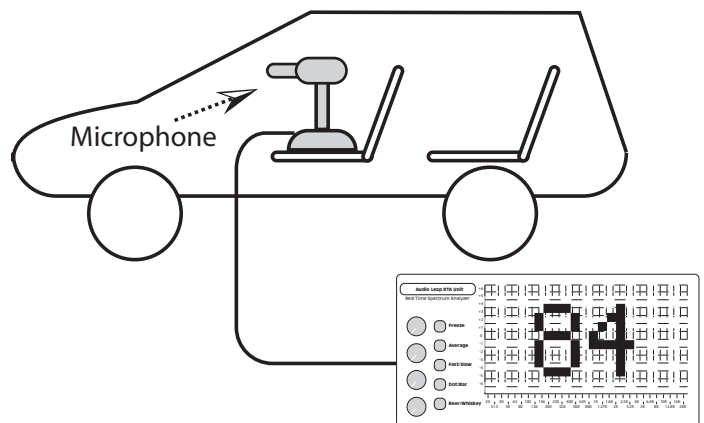
First we need place the RTA's microphone into the car on a microphone stand so that the microphone is located approximately at the same level as your head when you are driving. (Fig. 1 and Fig. 2)

Fig. 1 Top View



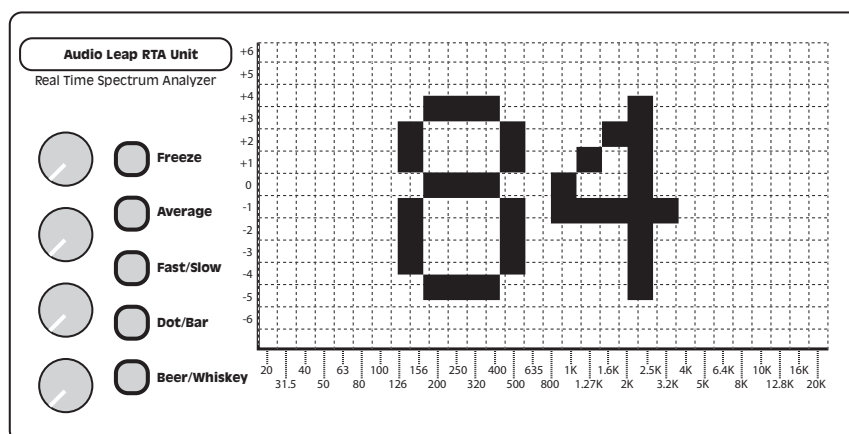
If you are going to be competing in any competition organization, be sure to place the microphone at the location specified in their rule book. Otherwise, just make sure the microphone is located at approximately ear level.

Fig. 2 Side View



Next, you want to place a CD into your source unit which contains a continuous pink noise recording. The various competition organizations sell CDs with this recording on them or track 18 from the AutoSound 2000 Test CD 102 could be used. Be sure to place your source unit into Track Repeat mode so it will keep playing the pink noise track only.

Now, with the RTA in SPL (Sound Pressure Level) mode, you want to turn the volume up on your system until you get a reading in the 80 - 90 dB range. This is how we set the volume to perform the RTA measurements and adjust the equalizer.



Adjusting Equalizer Controls

With the SPL set and the pink noise continuously playing through your system, put the RTA into analyzer mode. You will now see a graphical representation of how your system is working at playing back the pink noise test signal. Figure 1 gives you an idea of what you should be seeing, except yours will be moving up and down at the various frequencies.

Fig. 1

The pink noise that you are playing through your system is a recording of equal energy at all octaves being played at the same time. If you were to look at it as a pure signal, before it went through all your amplifiers, crossovers and speakers, it would look like the display in Figure 2.

How is this useful? Well knowing that the signal coming off the CD before it goes through your system is supposed to look like a flat line gives you a known reference. Looking at it with a microphone after it has gone through your head unit, equalizers, crossovers, amplifiers, and finally your speakers gives you an idea of how the signal is being affected by these components.

You also see the effect that speaker placement and phasing has on what you hear as well as how the car itself is affecting the signal.

The end result is the ability to look at how everything, and we mean everything, is affecting the sound you hear in your car. Does this mean we should equalize the car back to a flat line? The short answer is no. The long answer is no, unless you just want a flat line for showing you can do it. Many competitors will shoot for the flat line so they can get a "perfect score" in the RTA judging section of a contest but for listening a flat line would sound fairly dull and lifeless. That is why they use separate EQ's and switch between them. One for the RTA judging set up to get as close to a flat line as possible and the other for sound quality. If you don't believe me, just check with my cousin Bernie...you know the one...claims he can hear grass grow. I told you about him right?

So if I am playing a source which is essentially a flat line and you don't want me to equalize it back to a flat line, just what am I supposed to do? The key to using the RTA and pink noise is to look for major problems with the response curve and smooth them out. Remember from the introduction that we said 3 dB changes between 1/3 octave bands was the smallest change the human ear can detect? Well that is what we are trying to do here, simply keep each 1/3 octave band within 3 dB of the other as we go from 20 Hz to 20 kHz.

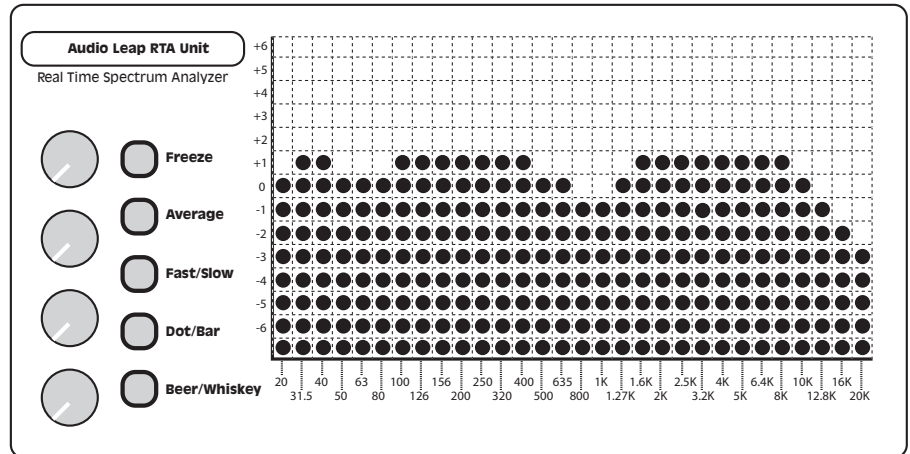
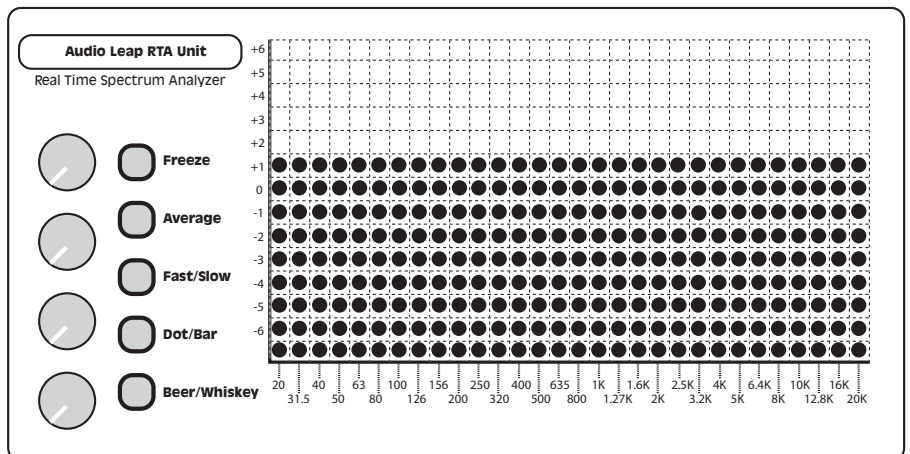


Fig. 2



Adjusting Equalizer Controls

Fig. 1 your response curve

The overall shape of the curve is not as important as keeping each band within 3 dB of those around it. You may like a real bass heavy sound while your friend does not. So you both can have smooth response curves that look different because they are based on how you like it to sound. (Fig. 1 & Fig. 2)

Neither curve is more right, it just depends on what you like the sound of. The one thing you do notice is that each 1/3 octave band is within 3 dB (3 dots) of the next band.

So what does a bad curve look like? Check out Figure 3. Notice how 31.5 Hz is 4 dB (Each dot represents 1 dB) below 40 Hz. See where 80 Hz is 4 dB above 63 Hz. How about that killer 4 dB spike at 250 Hz. The yodeling 5 dB valley at 3.2 kHz. That beautiful 4 dB high end slide off at 20 kHz. These are the problem areas in the curve that need to be corrected.

Your first step should be to always equalize out the peaks by turning the required controls down at or near that frequency. Next you would try to bring up the valleys by boosting in those areas or cutting around them. Your end result is to keep the sound you like but smooth out all the response curve so that from any one 1/3 octave band to the next there is no more than a 3 dB variation.

So if you start with Figure 3 you want to end up looking more like Figure 1 or Figure 2. Not necessarily the same curve but a smooth transition from band to band.

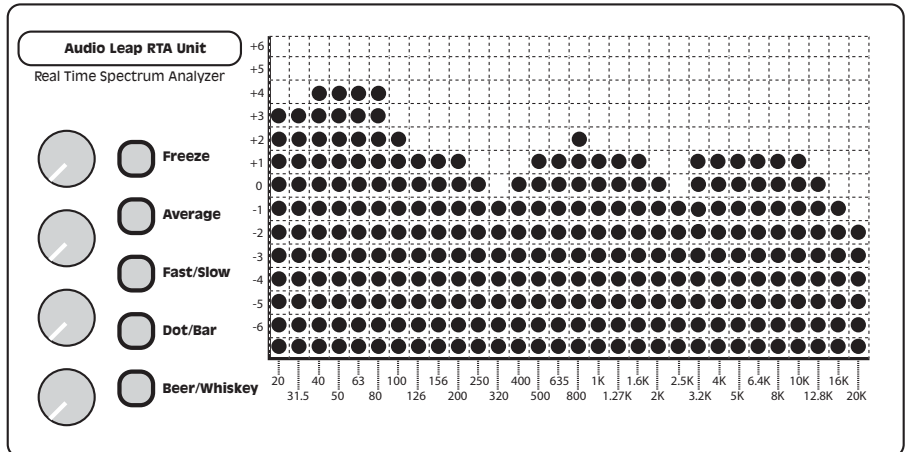


Fig. 2 your friend's response curve

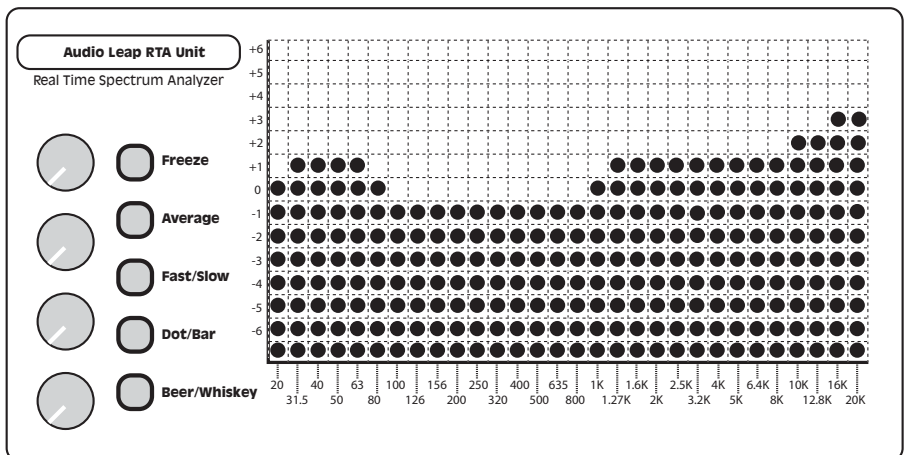
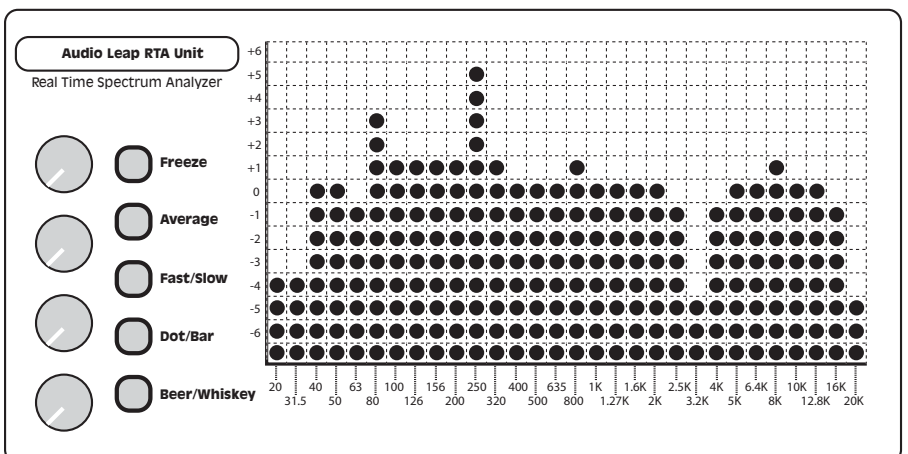


Fig. 3

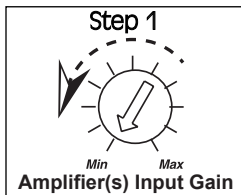


Adjusting Equalizer Controls

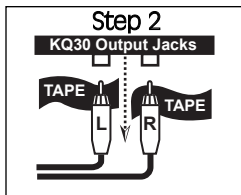
Final Gain Settings

If you have made it here then you have either tweaked your KQ30 by ear and skipped the **RTA Equalization** section, completed the **RTA Equalization** section or just skipped ahead to see how the story ends.

Now that you have finished tweaking the equalization bands on your KQ30 you are ready to do a final Output Level setup and balance check to insure optimum performance. This step is very similar to the initial level setting procedure with a few steps removed and a couple added.

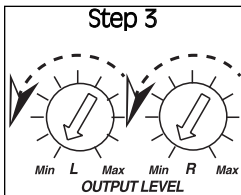


1. Turn the gain controls on your amplifier(s) all the way down.



2. Remove the RCA cables from the output jacks of the KQ30 and insulate them with tape.

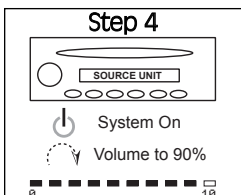
3. Set the Output Level controls on the KQ30 at their minimum (fully counter clock-wise) position.



4. Using a well recorded CD with a strong signal or better yet a continuous 1KHz tone recorded at 0 dB (track 10 from AutoSound 2000 CD 104), turn your source unit up to 90% of it's maximum output.

5. Turn the KQ30's Left channel Output Level control up until the Left channel output clipping LED starts to flash.

6. Turn the KQ30's Right channel Output Level control up until the Right channel output clipping LED starts to flash.



7. With a digital voltmeter set to the AC volts we want to measure the signal coming out the Left channel of the KQ30. Use a short RCA cable and place the meters probes on the shield and center pin of the RCA jack.

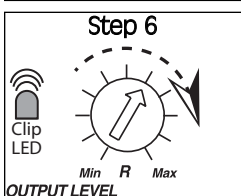
8. Now measure the Right channel using the same procedure as in step 7.



9a. If the Left and Right channel have the same reading do nothing. Skip steps 9b & 9c and proceed to step 10.

9b. If the Left channel reading is higher than the Right, turn down the Left channel Output Level control until it matches the Right channel. Skip step 9c and proceed to step 10.

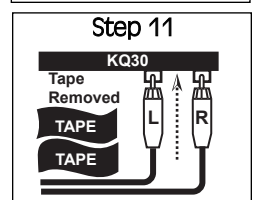
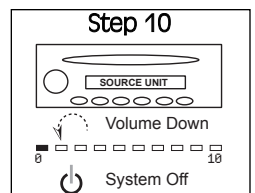
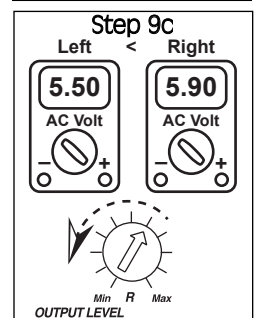
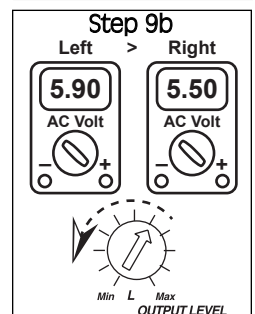
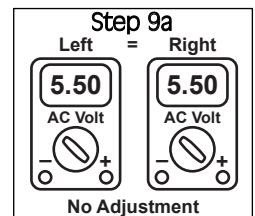
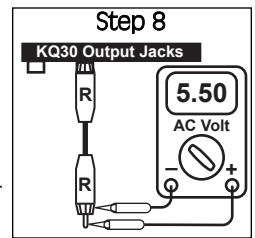
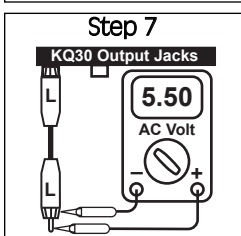
9c. If the Right channel reading is higher than the Left, turn down the Right channel Output Level control until it matches the Left channel.



10. Turn the source unit down and shut off the system.

11. Reconnect the RCA cables to your KQ30.

* That's it, you are now ready to enjoy the full capabilities the KQ30 has to offer you. Find cousin Bernie and share a cold beverage with him while you admire your work.



Adjusting Equalizer Controls

Cousin Bernie & Dr. Koneairea Chat Over Lunch

If after doing all your equalization and level adjustments you feel that your system lacks bite, even with your source unit turned up to 90% of its' full output potential, then the gain settings on your amplifier(s) may be turned up slightly. Keep in mind that the gain settings on any amplifier are for level matching only, they do not increase the power output of your amplifier. The lowest gain setting that will allow your amplifier to make full power is always best for sound quality, lowest system noise and reliability.

If you go back at a later date and make changes to the equalizer that involve boosting of the controls, you may need to perform the **Final Gain Setting** process detailed on page 19 again. A good indication that you need to do this would be if the Output Level Clipping LEDs stay on continuously. It is ok for the clipping LED indicators to blink, but they should never be fully lit up for any extended period of time.

Page 21 lists the specifications of the KQ30 and has a blank area to use as a notes page. Here you can scribble down any little tidbits that you may need to know later about how you installed this unit or adjusted it. Alternate uses of page 21 are:

- * Clean place to hold that slice of cold pizza you ordered two hours ago and never got to eat.
- * Your latest theories on why time travel is possible.
- * A napkin.

Page 22 has a blank KQ30 settings template. We recommend you make several copies of this page so that you always have a nice clean blank. Use the copies to keep track of your settings both during and after the KQ30 setup. This is helpful in case you ever need to dial back in your settings because of someone accidentally (or un-accidentally) altering them. *Note- don't confuse the alternate uses for page 21 with page 22. This will render page 22 unusable. If this happens you can download a new Technical Manual from www.Kicker.com.

If you have any specific questions concerning this product please contact your local Kicker dealer where you purchased your KQ30 or call us direct at 405-624-8510 and ask for Technical Support. The latest information is always available for download from our website at www.Kicker.com.

Enjoy!

Specifications

Operating voltage: 11 to 16 volts DC
Chassis Fuse: 2A mini-ATC

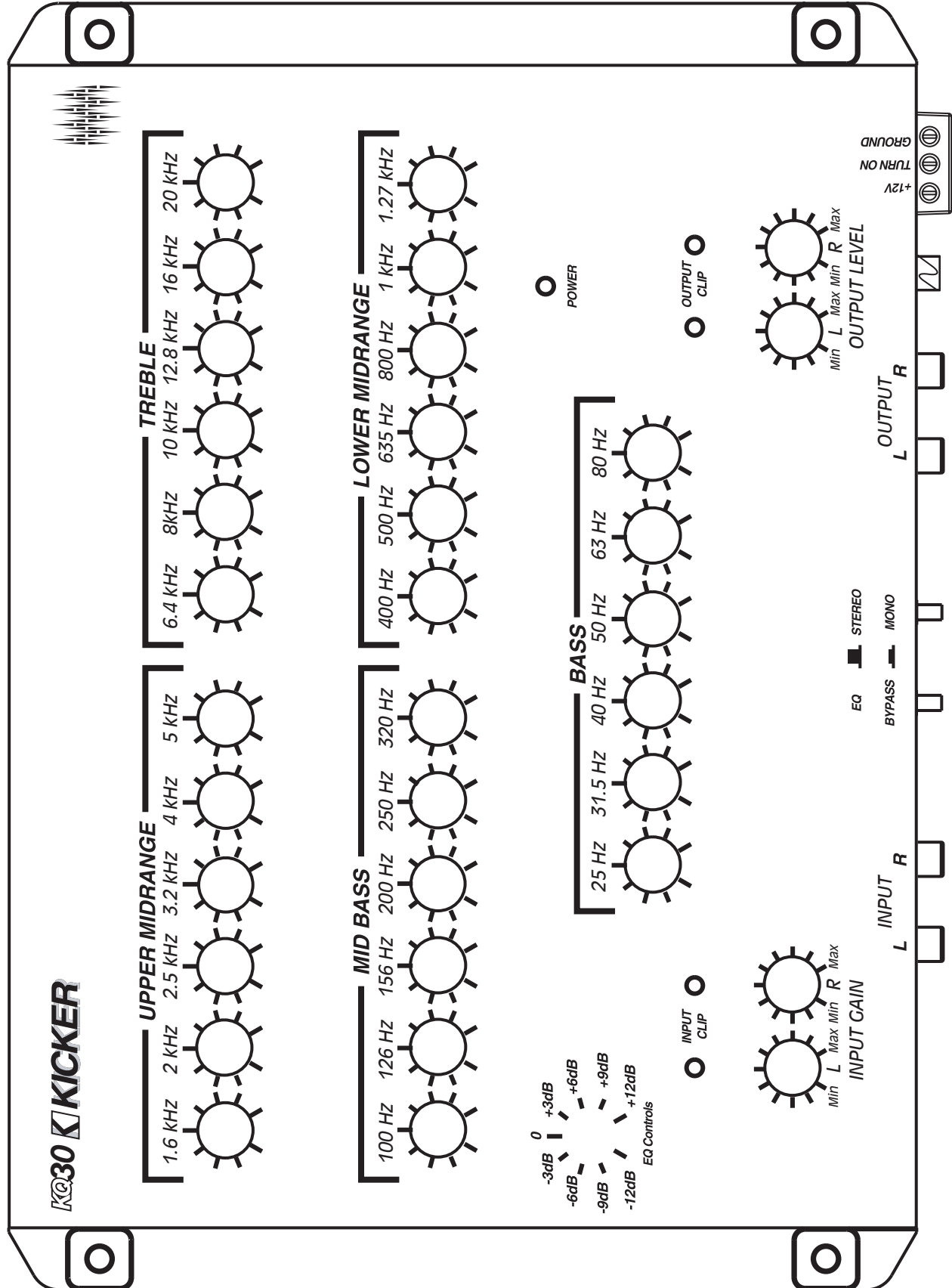
Audio Signal:
Minimum input voltage: 500 mV RMS
Maximum input voltage: 9 Volts RMS
Maximum output voltage: 9 Volts RMS
SNR (signal to noise), A Weighted: Re: 9 Volts / 120 dB
Channel Separation: Re: 9 Volts / 80 dB

Equalization: 25, 31.5, 40, 50, 63, 80, 100, 126,
30 bands 156, 200, 250, 320, 400, 500, 635,
1/3 octave centering 800, 1K, 1.27K, 1.6K, 2K, 2.5K,
+/- 12 dB per band 3.2K, 4K, 5K, 6.4K, 8K, 10K, 12.8K,
measured in Hz. 16K, 20K

Dimensions:
Width: 10.25 in / 26.04 cm
Depth: 7.50 in / 19.05 cm
Height: 1.125 in / 2.86 cm

Notes

My Settings



ELECTRONICS LIMITED WARRANTY

Stillwater Designs warrants this product to be free from defects in material and workmanship under normal use for a period of **three (3) years from date of original purchase when purchased from and installed by an Authorized KICKER Dealer or one (1) year from date of original purchase if purchased from and not installed by an Authorized KICKER Dealer**. If this product is labeled "B Stock", it is warranted for one (1) year from date of purchase, regardless of place of installation. Should service be necessary under this warranty for any reason due to manufacturing defect or malfunction during the warranty period, Stillwater Designs will replace or repair (at its discretion) the defective merchandise with equivalent merchandise at no charge. Warranty replacements on "B-Stock" merchandise may have cosmetic scratches and blemishes. Discontinued products may be replaced with equivalent products.

This warranty is valid only for the **original purchaser** and is not extended to owners of the product subsequent to the original purchaser. Any applicable implied warranties are limited in duration to a period of the express warranty as provided herein beginning with the date of the original purchase at retail, and no warranties, whether express or implied, shall apply to this product thereafter. Some states do not allow limitations on implied warranties, therefore these exclusions may not apply to you.

This warranty gives you specific legal rights; however you may have other rights that vary from state to state.

WHAT TO DO IF YOU NEED WARRANTY OR SERVICE

Defective merchandise must be returned to your local Authorized Stillwater Designs (Kicker) Dealer for warranty. Assistance in locating an Authorized Dealer can be obtained by writing or calling Stillwater Designs direct. You can confirm that a dealer is authorized by asking to see a current authorized dealer window decal.

If it becomes necessary for you to return defective merchandise, call the Kicker Customer Service Department at (405)624-8510 for a Return Authorization (RA) number. Package all defective items in the original container or in a package that will prevent shipping damage, and return to

Stillwater Designs, 5021 North Perkins Road, Stillwater, OK 74075

The RA number must be clearly marked on the outside of the package. Return only defective components. Non-defective items received will be returned freight collect.

Include a **dated proof-of-purchase** from an Authorized Dealer. Warranty expiration on items returned without proof-of-purchase will be determined from the manufacturing date code. Coverage may be invalidated if this date is greater than 18 months previous to the date item is sent in. Freight must be prepaid; items received freight collect will be refused.

Failure to follow these steps may void your warranty. Any questions can be directed to the Kicker Customer Service Department at (405)624-8510.

What Is Not Covered

This warranty is valid only if the product is used for the purpose for which it was designed. It does not cover:

- Products purchased from an unauthorized dealer.
- Damage due to improper installation
- Damage caused by exposure to water, excessive heat, chemical cleaners, and/or UV radiation.
- Damage through negligence, misuse, accident or abuse. Repeated returns for the same damage may be considered abuse.
- Freight damage.
- The cost of shipping product to Stillwater Designs.
- Items previously repaired or modified by any unauthorized repair facility.
- Items returned from unauthorized individuals or dealers.
- Return shipping on non-defective items.
- Products with tampered or missing barcode labels.
- Products returned without a Return Authorization (RA) number.

How Long Will It Take

Stillwater Designs maintains a goal of 24-hour service for all returns. Delays may be incurred if lack of replacement inventory or parts is encountered.

International Warranty

Contact your International Stillwater Designs dealer or distributor concerning specific procedures for your country's warranty policies.



P.O. Box 459 • Stillwater, Oklahoma 74076 • U.S.A. • 405 624-8510

STILLWATER
Designs®

WARNING:

KICKER drivers are capable of producing sound levels that can permanently damage your hearing! Turning up a system to a level that has audible distortion is more damaging to your ears than listening to an undistorted system at the same volume level. The threshold of pain is always an indicator that the sound level is too loud and may permanently damage your hearing.
Please use common sense when controlling volume!

January 2002

